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U. S. NAVAL HOSPITAL
Mare Island, Vallejo, California

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From: Officer in Charge, Artificial Limb Department
To: Medical Officer in Command

Sept.

Subj: Monthly Report on the Experimental Work of the Artificial Limb Department

Ref: (a) Advisory Committee on Artificial Limbs ltr dtd 21 Jun 1948
(b) Research Division ltr dtd 24 Jun 1949, BUMED CODE 71/DJD:gh

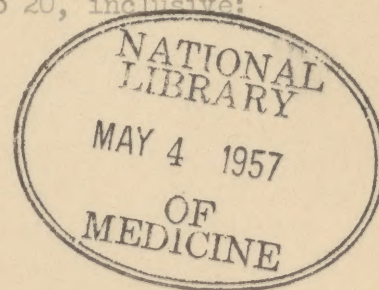
1. Monthly report required by references (a) and (b) is hereby submitted.
2. It is contemplated that the following staff members and patients will attend National Research Council, Advisory Committee on Artificial Limbs meeting to be held at Washington, D. C., October 17 to 20, inclusive:

Staff

Commander T. J. Canty, MC, U.S. Navy
Mr. Charles C. Asbelle
Mr. Wilbur C. Oliver

Patients

Lt.(jg) Sarah H. Griffin, NC, USNR
Ens. O. C. Johnson, USN
Mr. Harold Webb



3. The following projects are under production, experimentation and further study:

(a) Lower Extremities Section:

I. Foot and Ankle (NM 009 035)

Additional graphs in the form of moment curves are being made on the ankle joint. A series of amputee cases, both below knee and above knee, who have been wearing the ankle for various periods up to ten months, have been tested and curves plotted on each individual case. The stresses occurring about the ankle joint are those that the individual amputee desires, and it is found that there is a wide variation in the stresses amongst the individual cases. As an example, the figure for resistance to rotation varies from 3.8 inch pounds per degree up to 10 inch pounds per degree. The figures for dorsi-flexion and plantar-flexion also have wide variations. It is felt that this is a desirable feature of the ankle joint as it can be varied to fit the needs of the individual patient. A number of rubber ankle blocks are being manufactured incorporating lamination of both steel and fiber, and these blocks will then be tested. It is believed that this type of bumper will allow greater rotation and a greater variation in the resistance to plantar and dorsi-flexion. The sponge rubber fairing is still causing considerable difficulty inasmuch as some patients' fairings are in excellent shape even after

six months wear, while others promptly wear out in a matter of a few months. It is apparent that those cases that wear out the sponge rubber fairing quickly are those individuals who utilize the maximum angle of dorse-flexion in walking, while in the case that uses the minimum angle of dorsi-flexion the fairing will stand up well.

The accelerated testing machine is in operation and various combinations of ankle joints are undergoing life cycle testing.

II. Shank (NM 009 015)

Additional models for the new cosmetic shaped plastic shin are being made, and it is contemplated to have molds manufactured for five lefts and five rights. This number should allow a match for the great majority of patients.

III. Knee

(a) Mechanical (NM 009 036)

The latest design of the variable cadence knee joint has been fitted to a number of amputees and slow motion moving pictures taken at the University of California have been processed. These pictures readily show some of the advantages of this knee joint. A total of seventeen cases have been fitted with the various models of the variable cadence joint. It is felt that the variable cadence joint is the first approach in a mechanical mechanism which simulates most of the functions of the human knee joint.

(b) Hydraulic (NM 009 037)

The aluminum hip joint in the hydraulic tilting table unit broke while being worn by an amputee. This joint was designed with only a ten percent safety factor in breakage, and theoretically this joint should have broken in use. It is contemplated to now design an aluminum joint that will allow a safety factor of from fifty to seventy-five percent, and then to test it on an amputee.

Units are being constructed for two new cases, one a disarticulation at the hip and the second case with a very short thigh stump with a marked flexor contraction.

IV. Cosmetic Problem (M, 009 025)

No additional work has been done this month on the cosmetic covering.

V. Brief summary of status of models as a unit.

(a) Suction Socket (NM 009 029)

Work is continuing in the fitting of below knee suction socket cases. The search for a satisfactory substitute for the leather liner is continuing.

(b) Slip Socket (NM 009 038)

Additional cases with short below knee stumps are being fitted with the slip socket.

(b) Upper Extremities Section:

I. Above elbow arm (NM 009 022)

An amputee model of the above elbow arm, incorporating an elbow lock, is being manufactured.

II. Hands, Hooks and Tools (NM 009 023)

A voluntary lock on the Robinson hand is working successfully on a breadboard model, and a number of units are being manufactured for trial on amputees.

III. Cosmetic Problem

No work has been done on the cosmetic problem of the arm this month.

IV. Harness and/or other outside control (NM 009 026)

All cases are now being fitted with a single nylon shoulder harness.

V. Brief summary of status of models as a unit.

(a) Cineplastic prosthesis (NM 009 031)

A bilateral, above elbow, pectoralis cineplastic case is wearing his prostheses and utilizing them to a marked degree. This patient is utilizing a pronator and supinator unit on the left side and uses no pronation or supination on the right side. This combination has proven to be most satisfactory for this individual case, although one of the German amputees, Hans Schuffenhauer, utilized pronation and supination on both sides to advantage. The biggest difficulty the present case is experiencing is the inability to grasp an object with the desired amount of grip in the hook. It is felt that the new APRL hook, which has a maximum of gripping power, would be a great advantage to this case. A request has been made to the University of New York to supply an additional hook to this patient, and we hope to fit this case with an APRL hook on one side and the conventional hook on the other side in order to determine which combination is best for this particular case.

The below elbow amputee with the biceps motor is wearing the newly designed prosthesis. This patient is remarkably enthusiastic with his present unit. He is able to operate his hook with the arm in any position possible, and he is very gratified with the relief of being able to dispense with all shoulder harness.

T. J. CANTY
CDR, MC, USN